Home-Exploiting or Home-Augmenting? Evidence from Patenting Data on the Drivers for Large Global Firms to Internationalize their Innovation Activities to Asia

Poh Kam Wong (pohkam@nus.edu.sg)
Professor, NUS Business School
and Director, NUS Entrepreneurship Centre

Yuen-Ping HO
NUS Entrepreneurship Centre

National University of Singapore
E3A Level 6, 10 Kent Ridge Crescent, Singapore 119260

Theme: Globalization of Science and Innovation

Abstract

The internationalization of R&D by multinational companies (MNCs) has gained increasing research attention in recent years, spurred by the growth of R&D conducted in foreign subsidiaries, and interest in the influence MNCs have on the innovation systems of their home and host countries (Criscuolo and Patel 2003, Le Bas and Patel 2005). Patents and patent citations have been widely used in studying various aspects of this phenomenon (Criscuolo et al 2005, Verspagen and Schoenmakers 2004, Frost and Zhou 2005).

Many studies analyzing geographical knowledge flows at the country or regional level focus on operations hosted in the advanced economies in North America and Europe (Criscuolo et al 2005, Criscuolo and Patel 2003, Verspagen and Schoenmakers 2004, Singh 2004). In contrast, there has been considerably less research on non-Japan Asian economies that have attracted increasing foreign MNC R&D activities in recent years, with some exceptions (e.g. Wong (2008), Almeida and Phene (2004), Hegde and Hicks (2008) and Song & Shin (2008)). This paper adds to this body of literature by investigating the trend and pattern of internationalization of patenting activities by the largest, technology-intensive MNCs in non-Japan Asia. In particular, we trace the timing and expansion pattern of geographical diversification of patenting activities into Asia by the 500 largest US patent-owning companies in the world over the period 1976-2005. By analyzing the citation links of a subset of these companies' Asian patenting activities, we investigate the extent to which the innovation activities of these companies in non-Japan Asia are driven to exploit home-base technological strengths, or are mainly to tap host-country technological strengths to augment home-base resources (Kuemmerle, 1999). This citation-link analysis is further supplemented by examining the differences in the composition of technology fields of patenting activities in Asia vs. the home-base of these companies. While prior studies of the home-exploiting vs. home-augmenting innovation strategies of global firms primarily rely on survey of the R&D managers of these firms, our analysis using patent and patent citation links provide an alternative source of empirical evidence.

Data Sources

Following Almeida (1996), Frost (2001) and Criscuola et al. (2005), we use patent data to proxy knowledge flows that represent MNC strategies. In particular, our analysis draws on a dataset that we have constructed to cover the 500 largest

corporations in the world in terms of cumulative number of USPTO patents granted to them over the period 1976-2005. Public research institutions are excluded from the data set, while companies that no longer existed at the end of the 2005, or had undergone mergers and acquisition, were eliminated or had their patent portfolio assigned to the new merged entities.

Preliminary Findings

Our preliminary findings suggest that, despite popular media hype about globalization of R&D activities, the inventive activities of the world's largest technology corporations remain highly localized within their national borders, with the share of patents invented overseas increasing only slightly from 9% as of 1990 to 11% as of 2005, and the share of patents co-invented across national borders rising from 1.5% as of 1990 to 3% as of 2005. However, our analysis does show that patenting in non-Japan Asia by these global technology firms increased more substantially, from 0.1% of their patents as of 1990 to 3.1% as of 2005. Regional differences in the propensity to locate inventive activities in non-Japan Asia emerge, with the North American and European corporations having a higher propensity than Japanese companies. Analysis of the technological fields in which the corporations are patenting also shows a strong focus on exploiting non-Japan Asia's growing technological competitive advantages in electronics and ICT. In terms of the Kuemmerle drivers for overseas R&D, our preliminary analysis suggests that home-exploiting remains the dominant driver, with variations across the major Asian economies that are consistent with our theoretical predictions based on the stages of technological development of these economies.

The full paper will include more disaggregated analysis of the relative importance of home-exploiting vs. home-augmenting strategies by key technological fields and nationality of majority ownership of the MNCs (US vs. Japan vs. Europe). Policy implications for the Asian host economies will be discussed, including the possible role of host-country policies to influence the composition of home-exploiting vs. home-augmenting R&D activities by foreign MNCs, and the merits of doing so. Potential bias and limitations of the use of US patent data in the empirical analysis are discussed, and suggestions on possible future research to use EPO patenting data for complementary analysis are proposed.

Key Words: R&D globalization, Asia, internationalization of innovation activities, overseas patenting